

# Asleep Behind the Wheel

Jason Ferguson, BPA, NRP

Central Virginia Community College

Centra One, Flight Services

# Topics

- Discuss incidents caused by sleep deprivation
- Define Sleep Deprivation
- Discuss the effects of sleep deprivation
- Relate sleep deprivation to EMS
- Discuss strategies to combat the effects of sleep deprivation

# Three Mile Island

## **Three Mile Island - March 28, 1979**

The nuclear accident at Three Mile Island occurred between midnight and three A.M. when night workers tend to be the drowsiest and was caused by a serious lack of judgment. A cooling malfunction caused a meltdown that destroyed the #2 reactor. Although some radioactive gas was released, luckily, no injuries or health problems ensued.



# Chernobyl

- **Chernobyl Nuclear Disaster -  
April 25, 1986**

Another meltdown disaster, this time in the Ukraine and again linked to sleepiness. A shutdown and test of reactor #4 was to take place at 1 A.M. Things went awry when several safety features were turned off, and the rest, as they say, is history.





# Columbia Space Shuttle

- January 6, 1986 at the Kennedy Space Center. Before the Columbia space shuttle was to be launched, an over tired operator pressed the wrong button, the button that released needed fuel from the shuttle's tank. Fortunately, the error was detected in time to cancel the launch. . (2)



# Challenger

- **Space Shuttle Challenger -  
January 28, 1986**

The managers who authorized the launch prior to the Challenger explosion in 1986 had had little sleep the night before. The mission, beset by problems from the start, had kept crews working around the clock to iron out problems.



# Exxon Valdez

- **Exxon Valdez Oil Spill, March 24, 1989**
- When the Exxon Valdez went aground off Alaska, first reports said the accident was caused by a drunken captain. Later investigation, however, suggested that the captain had turned over command to his first mate who was extremely sleep deprived. He had slept only six hours in the previous 48. The cleanup of the spill cost more than two billion dollars and the damage to the environment was tremendous.



# American Airlines Crash

- Pilot fatigue and the resulting diminished judgment were given part of the blame for the 1999 American Airlines crash in Little Rock, Arkansas



# Staten Island Ferry Crash

Staten Island Ferry Crash-

October 2003.

The assistant captain piloting the ferry made no attempt to slow the boat down because he was sound asleep at the controls.





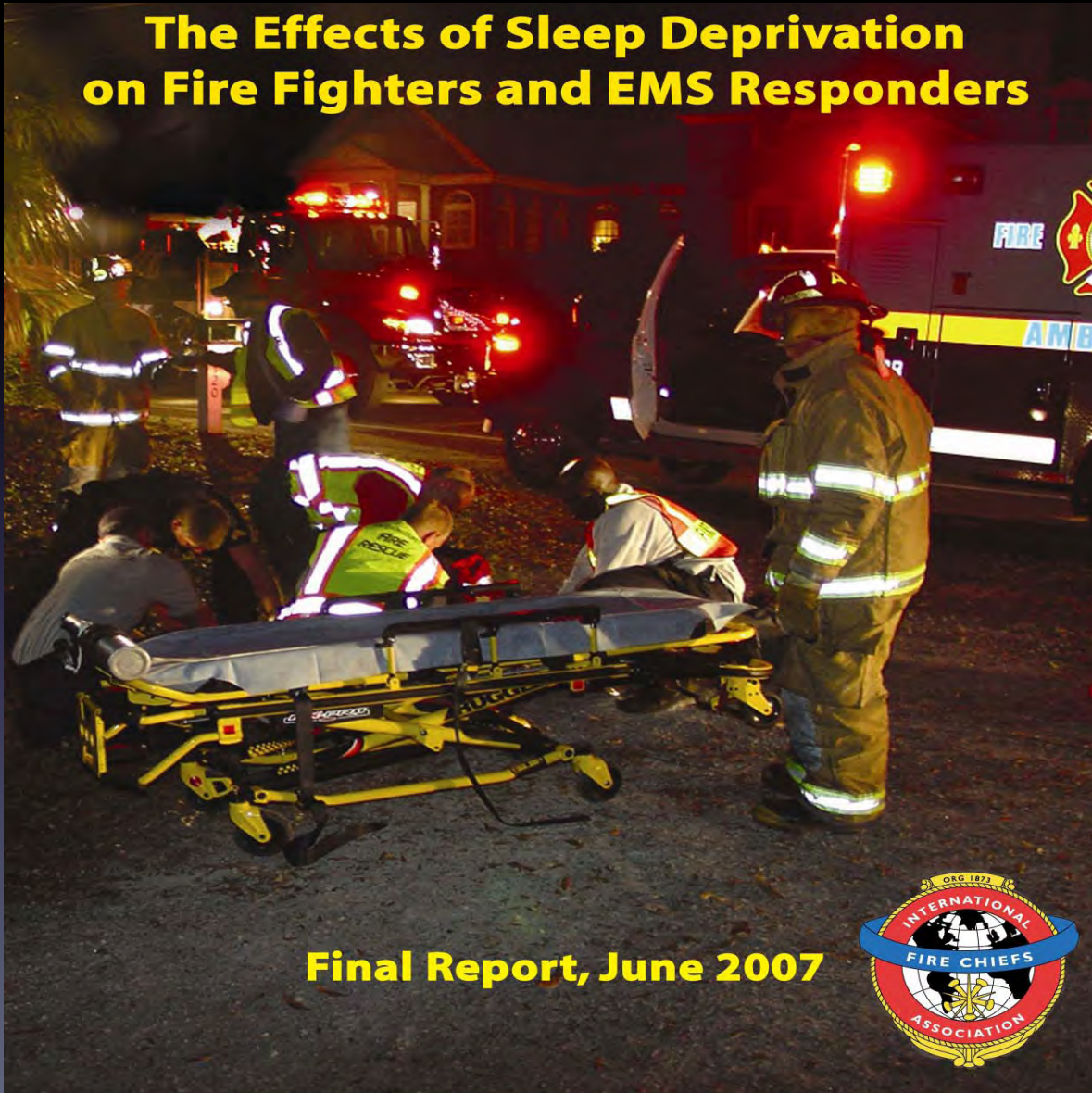
# India Gas Leak

- Gas Leak in India - December 3, 1984
- Early hours of the morning; inattentive workers who failed to respond to the danger. A storage tank overheated releasing deadly gas. As many as 600,000 people were injured and 15,000 or more have died. Many more are still suffering from the after effects and traces of the contamination are still present.



# Awareness Increasing

## The Effects of Sleep Deprivation on Fire Fighters and EMS Responders



**Final Report, June 2007**





# Top 5 Most Sleep Deprived Professions

1. Home Health Aides
2. Lawyers
3. Police Officers
4. Physicians, Paramedics
5. Economists



# Sleep

- Humans are “day creatures”
- Circadian Rhythms
  - Sleep/Wake Cycles
  - Professional Baseball Teams Travel
    - 63% won when traveling West to East
    - 56% won when traveling East to West



# Sleep Deprivation

- Acute Sleep Deprivation
  - Less than 4-6 hours sleep in 24 hour period
  - Missing just one night's rest
- Chronic Sleep Deprivation
  - Multiple nights of lack of sleep
  - Leads to long term health issues

How Many of You Use the  
Following to Stay Awake?

# Coffee



# Rolling Down the Window When Driving



# Turning Up the AC



AIR CONDITIONING

you're doing it wrong



# Turning Up the Radio



# The Truth

- Not Effective Ways to Wake up
- Just like watching TV is not an effective way to fall sleep
- Let's look at sleep



# Sleep

- Non-REM Sleep
  - 4 Stages
  - Body does physical repair
  - 75% of sleep
- REM Sleep
  - Dream State
  - Mental health restored
  - 25% of sleep



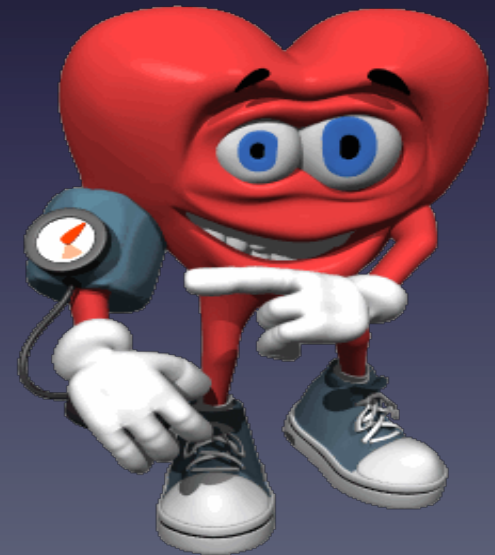
# Non-REM

- Stage 1
  - Resting; easy to awaken
- Stage 2
  - Arousal more difficult
- Stages 3 & 4
  - Deep Sleep
  - Physical Repair



# Non-REM Stages 3 & 4

- HR Slows
- BP and Metabolism Reduced
- Hormones secreted for repair
- Difficult to wake up



# REM

- Dreaming occurs
- Emotions processed
- Cognitive memories consolidated



# Drunk Feeling

- Studies show that being awake for 18 hours produces impairment equal to a blood alcohol concentration (BAC) of 0.05, and deficits reach a BAC equivalent of 0.10 after 24 hours of sleeplessness. Thus, a drowsy driver may be as dangerous as a drunk driver (Dawson & Reid, 1997; Falleti et al., 2003).





# Sleep Inertia

- *sleep inertia*- impairment in alertness immediately upon waking.
- Most severe in the first 30 minutes after awakening
- Although an individual may feel 'awake' after a few minute, studies indicate that it may take as long as **two hours** to be fully alert when awoken from a deep sleep (Jewett et al., 1999; Wertz et al., 2006).

# Cardiovascular Effects

- Comparisons are difficult, but some have suggested getting less than six hours of sleep per night increases heart disease risk comparable to that of smoking a pack of cigarettes a day (Akerstdt et al., 1984).
- Lack of repair and unhealthy lifestyles



# Digestive

- Up to six-fold increase in gastrointestinal disorders, such as peptic ulcers, indigestion, diarrhea and constipation, observed among those with sleep deprivation and night shift work (Reid et al., 1997; Orr & Chen, 2005).



# Obesity

- Too tired to exercise
- Over or unhealthy eating
- Hormonal imbalance



# Diabetes

- Weight gain and obesity are associated with development of type 2 diabetes (Speigel et al., 2005). Short sleep durations more than double the risk of developing diabetes (Yaggi, Araujo & McKinlay, 2006).



# Immune System

- sleep deprivation increases susceptibility to infections (Mohren, Jansen & Kant, 2002).
- Your body needs time to repair!



# Shift Work

- Workers beginning a series of night shifts generally sleep poorly following each of their night shifts, and the cumulative effect of lack of restorative sleep may explain the higher accident rate observed with each successive night shift worked, so that by the fourth night the risk is increased 36 percent above the first night (Folkard, Lombardi & Tucker, 2005).



# EMS and Fire Services

- 36% 24/48 hour schedules
- 23% 24/24 with 4 days off
- 3% 48/ 96
  - This format originated in Southern California, because fire fighters were unable to afford local housing and faced long commutes, which were reduced in half with that schedule.



# University of Pittsburg

- A study by researchers at the University of Pittsburg, published in *Prehospital Emergency Care*, clearly links sleep deprivation of EMS responders to increased rates of injuries and medical errors.(1).
- Researchers evaluated the sleep quality of EMS responders from a variety of agencies across the U.S. to assess physical and mental fatigue. Over the same period of time, they examined safety outcome data to determine provider injury, medical errors, adverse events and safety-compromising behaviors, such as excessive speeding.

# Results

- Increased medication errors
- More vehicle accidents
- Less attentive to patients
- Increased Stress and Mood Swings



# The Toll of Sleep Deprivation

- Brian Gould
  - 42-year-old paramedic
  - died when driving home from an overnight shift when his car crossed lanes and struck a semi head-on
  - the ambulance service instituted a policy that if a crew gets less than four hours of uninterrupted sleep during a 24 hour shift, colleagues were to take them and their vehicles home after work (Erich, 2007).



*Courtesy: The Denver Post*

# What Can We Do?

- How does your agency address this issue or do they?
- What are some strategies we can employ to deal with this?
- Take about 10

# What Can We Do?

- Live a healthy lifestyle
- Get proper rest, exercise, eat right and hydrate.
- Avoid Tobacco products
- “Power naps” or “maintenance naps,” ranging from 20 to 45 minutes, can be helpful in improving alertness and reducing potential errors.



# The Agency's Role

- • Educate workers about the dangers of drowsy driving. Provide alternative means of getting home or provide a place for workers to nap before driving home.
- Provide opportunities and facilities for exercise breaks. Moderate physical activity increases alertness.
- Consider fixed shifts. They tend to cause less disruption of circadian rhythms than rotating shifts.



# The Agency's Role

- Offer sleep disorder screening.
- When filling a vacation spot, schedule as far in advance as possible in order to allow for adjustments to sleep schedules.
- Be alert for potential substance abuse.
- Consider limiting the number of consecutive shifts an employee can work.

# How Do You Measure?

**Table 1.1. The Epworth Sleepiness Scale**

How likely you are to fall asleep or 'doze off' during these situations?

	would never doze off	slight chance of dozing off	moderate chance of dozing off	high chance of dozing off
1. Sitting and reading	0	1	2	3
2. Watching TV	0	1	2	3
3. Sitting and talking with someone	0	1	2	3
4. Passenger in a car for an hour	0	1	2	3
5. Lying down to rest in the afternoon	0	1	2	3
6. Sitting quietly after lunch	0	1	2	3
7. In a car stopped for a few minutes in traffic	0	1	2	3
8. Sitting inactive in a public place, like a meeting or classroom	0	1	2	3

# Take Aways

- You need 6-8 hours of sleep per night
- Caffeine/other ways to stay awake don't work
- Naps lasting 20 mins to 2 hours are good
- Your body needs time to repair
  - Physically
  - Mentally

# Questions

FergusonJ@cvcc.vccs.edu